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Bogart's Patent Self-Generating Gas Furnace.

Shortly after the introduction of the use of gas for illuminating purposes, the idea that it might be made to subserve the use of crude fuel began to dawn upon the intellect of the few, whose minds had been awakened to a practical rather than a scientific view of the subject. Experience has proven that there is scarcely

Fig. 1.

a trade or profession where heat is required, that gas cannot be made available, and there is no branch of housekeeping in which gas cannot be brought into use, as the cheapest, the most convenient, the cleanliest and the most healthful of all calorific agents.

The experiment, however, for a long time seemed likely to prove a failure, Inventors have from time to time changed the *form* of the *burners*, still adhering to the accustomed use of either perforated metal, or wire gauze, as a covering, against which the flame impinged, and through which an insufficient amount of atmospheric air could pass, in combination with the gas, to perfect combustion; hence a bad air was generated from the impure products, and headaches supervened. They were detrimental to health, and as a general rule were condemned.

Thus experiments after experiments went on, until several mechanical devices have been perfected by Mr. A. L. Bogart of New York, by which a perfectly inodorous combustion is obtained They are especially designed and applied to answer the use of every known trade or profession where heat is required, as well as in the form of heating and cooking stoves, ranges, etc.

Mr. Bogart also discovered a further neutralizing agent, which secures the healthfulness of his heating stoves, in quick lime, through which the heat issuing from an unencumbered flame is made to pass, and all its poison absorbed, preventing its admission to the room. The application of this improvement to the "Metropolitan" gas-heating stove, has secured the endorsement of the medical faculty.

The accompanying engravings illustrate Mr. Bogart's latest invention, the "Mephistopheles," a self-generating gas furnace (Fig. 1), and the retort and burner combined (Fig. 2), patented January 3rd, 1871

The fountain, A, is filled with one gallon of a hydro-carbon of light gravity (fifteen cents per gallon)- In its passage through the hollow retort, which forms a part of the burner, it is converted into a *fixed gas*, and *supplies the burner for eighteen hours!* It provides sufficient caloric to heat a large room, and is unsurpassed as a cooker. The furnaces are constructed with one, two and three holes.

The size of the retorts can be increased so as to supply an almost unlimited number of jets; the illuminating power of the gas is far superior to that of ordinary coal gas. The heating burner produces a perfect combustion, without odor or deposit of carbon.

Mr. Bogart has employed one of the "Mephistopheles" furnaces (at an expense of less than ten cents per day for fluid,) for heating his store, 702 Broadway, where its practical operation has been witnessed and approved by many of our gas experts.

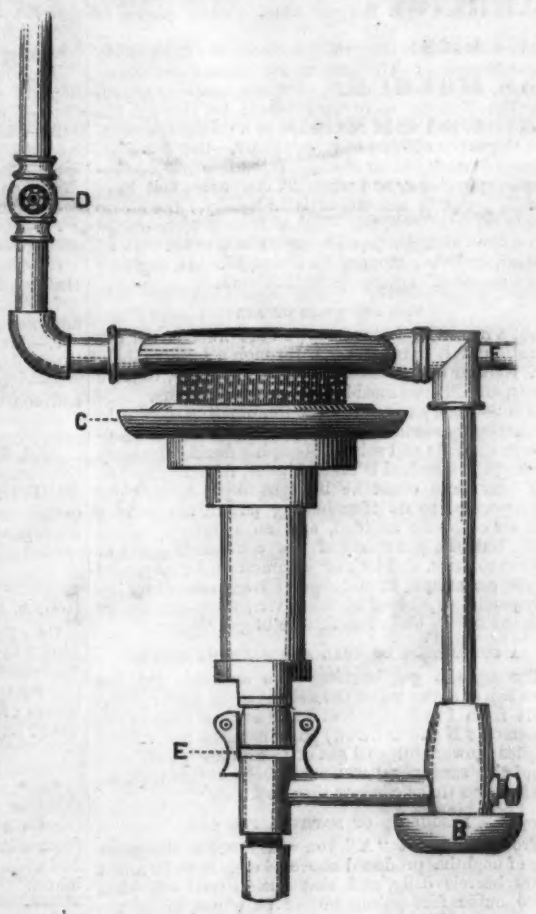

Fig. 2.

A Novel Water-Pipe Protector.

The unwelcome visit of the plumber to stop the too liberal water supply in our houses has been an incident of unpleasantly frequent occurrence during the late severe frosts. The *Building News* describes an arrangement in England for the prevention of this domestic nuisance. Certain valves and cocks are connected with the pipes, which, that they may be *self-acting*, are weighted in such a manner that when left to themselves and unsupported, they immediately shut off the supply of water and empty the pipes. They are prevented from doing this in ordinary weather by being suspended from a small tube of glass containing water, and specially manufactured for the purpose. As soon as a sharp frost occurs it attacks the glass tube, the water within which, quickly becoming frozen, expands and bursts the tube. The weighted valves and cocks, thus losing their support, immediately fall, shut off the water supply, and empty the pipes. The frost thus becomes the active protecting power of the pipes, instead of, as heretofore, being the cause of injury to them. The apparatus cannot fail, it allows water to be easily obtainable from the pipes during the continuance of the frost; and when the thaw comes, the trifling cost of the renewal of the glass tube again effectually guards against the enemy.

Chemical Repertory,

No. 51.—April 17, 1871.
EDITOR—HENRY WURTZ.

[ORIGINAL COMMUNICATION.]

A REPORT ON PETROLEUM-NAPHTHA GAS, TO THE PRESIDENT AND BOARD OF DIRECTORS OF THE FORT WAYNE GAS-LIGHT COMPANY.

By HENRY H. EDGERTON, Superintendent.

[Continued from page 100.]

MANUFACTURE.

The naphtha gas is made in the following manner: A still, holding forty barrels of naphtha, contains a coil of two inch pipe—steam passes through the coil volatizing the naphtha; the pressure carried on the still being on an average about one half inch. The vapor passes to three benches of three retorts each, by a three inch pipe, one and a half inch branches to each retort are tapped into side of mouth piece; inside the retort lies a six inch cast iron pipe to within one foot of back end, open at back and plugged in front with a clayed stopper; into this pipe is tapped the one and a half inch branch. The vapor circulates backward to end of six inch pipe, then forward and up stand pipes, which are six inches in diameter. During this transit it is converted into gas, and passes through a submerged U shaped condenser eighteen inches in diameter, lying in a tank with sufficient inclination for drip. A direct acting "Cameron" air pump is used as an exhauster (working a three inch vacuum on retorts), fitted with a bye-pass, and its motion governed by a float holder working on a throttle valve; the gas is then passed through a station meter and "mixer"; at every revolution of station meter, forty-two per cent. of air being drawn in by a reverse drum on same spindle, and mixed with the gas, which thence passes to holders.

The following is the average result of a day's working at Memphis: The fires under retorts, previously banked, are allowed draft—the still properly filled, from the benzine store tank, steam let through the coil in still, and when retorts are at a proper temperature the vapor allowed to pass through—the gas is generated [mixed] at an average rapidity of 12,000 cubic feet per hour, and when 90,000 cubic feet have passed, (or such amount as is necessary,) the steam is shut off from coil, lids slacked from retorts—plugs taken from six inch pipes lying within, to see that all is clear, and work stopped for the night. An engineer and a stoker are necessary for this work.

THE PRESENCE OF AIR

is not a necessary feature—as you are aware from observation of it burning pure, through a suitable burner. Neither is it necessary, as many suppose, to have in suspension condensable hydro-carbon vapors.

It is necessary to reduce the illuminating power to the arbitrary standard of from 15 to 20 candles, although as made and sold at Memphis during the early evening the standard is much higher, fully 25 candles.

If consumers could be brought to pay for this gas in proportion to its illuminating power, the mixing with air could be avoided, and an immense saving made, but the generality of gas consumers glory in their ignorance, and lack of common sense, in regard to gas consumption, and repel advice offered by the only parties capable of advising, viz., those conversant with the nature and manufacture of gas.*

A COMPARISON OF COAL AND NAPHTHA GASES.

The naphtha gas, burning pure and unmixed, has from five to seven times the illuminating power of gas made from Pittsburgh coal: it is evident then (from Statements B and C below) that naphtha gas of 100 candles power and coal gas of 15 candles power cost about the same per 1,000 cubic feet. or that naphtha gas is seven times cheaper than coal gas.

RESOURCES OF NAPHTHA FOR GAS.

From statement "A" you will observe the quantity of naphtha produced above 56 deg. B. to be about 5,000 barrels daily, and that each barrel will yield 4,000 cubic feet (minimum) of pure gas, hence the supply of naphtha alone is adequate to the production of 20,000,000 cubic feet of gas, equal in illuminating power to 200,000,000 cubic feet of coal gas. The tax collected in the United States on gas on an average of 20c per 1,000 cubic feet is in round numbers $2,000,000, equal to 10,000,000,000 cubic feet; add 20 per ct. for leakage and we have 12,000,000,000, as the yearly production in the United States; whereas benzine alone is adequate to the production of 60,000,000,000.

So it would seem. that those who hang either their hopes or their fears on an inadequacy of supply are equally mistaken.

The use of naphtha gas for enriching coal gas is the first, and undoubtedly the best use it can be put to, in existing Works. Using it in this manner and without mixing with air, the capacity of a Works is doubled or trebled, for the simple reason that the same mains will *carry more light* through them of this gas than of coal gas. The first result of the use of this gas will be to decrease the profits of gas works—the second to increase them in greater proportion.

The first will be due to the fact that from the increased lighting power and gravity, of this gas, *less gas will be burned*; the second result because you use up your greatest competitor, benzine (Statement E), and because the disproportion in illuminating power between gas and other illuminants will be increased. It is undoubtedly a fact that there is a tendency among all consumers to increase of consumption (Statement D), therefore it is an object to have the greatest possible number for the "tendency" to grow upon (Statement F).

Finally the following conclusive reasons may be given in favor of naphtha gas:

1.—The cost of a gas works, designed for naphtha gas, is less than one-half that required for coal.—Statement G.

2.—The gas has from five to seven times the illuminating power of coal gas, made at the same cost.

3.—The manufacture is attended with less danger.—Statement H.

4.—The supply of raw material is more than adequate.—Statement A.

5.—The raw material used is the greatest competitor of coal gas, especially in the West.—Statement I.

6.—The distribution is vastly more equable over an undulating surface.

7.—The odor of the gas is agreeable and yet as penetrating as that of coal gas, while the products of combustion are innoxious.*—Statement J.

8.—Freight on raw material is in favor of naphtha gas, 3-to-1, assuming the rates to be the same.

9.—The leakage of naphtha gas will be immensely less than of coal gas,

The following objections have been urged against naphtha gas:

1.—That it is not a permanent gas.

2.—That it is more dangerous and explosive than coal gas.

3.—That there is an insufficiency of raw material.—Statement A.

4.—That the mixture of gas and air will "stratify."

5.—That the handling of the raw material is fraught with great danger to the community.—K.

6.—That the consumers of this gas still complain of their gas bills.

7.—That the mains and services will not carry this dense gas in sufficient quantities.—G.

8.—Finally, that it is not a patentable process; and if valuable, all are at liberty to use it—L.

9.—That it is only suitable, at best, for small works and consumptions.—M.

STATEMENT A.

Prof. SILLIMAN says: "I have had occasion to become acquainted with the production of petroleum in the Oil Creek region. It will fairly average 20,000 barrels per day of crude oil, of which, probably, 5,000 are higher than 56 Beaume in gravity."

OFFICE OF CLARK, PAYNE & CO.,
OIL REFINERS, Cleveland, Ohio.

Hon. A. P. EDGERTON.

Dear Sir: * * * December daily productions, 14,686 barrels; other papers make it about 15,000. The stock on hand by one report is 585,000 barrels, and by another 609,000; so, as this is the poorest month of the year, it does not look as if the supply would be very short. Very respectfully,

N. P. PAYNE.

* * * "There need be no fears of a supply of gasoline, or naphtha. * * * Our works make 300 barrels a day, and Cleveland at least 1,000 barrels [equivalent to the gas supply of New York. Philadelphia and Chicago]. In bulk it will average 90c or $1 per barrel."

N. P. PAYNE.

B.—The cost of benzine, in bulk, in the refining districts, will vary between 75c and $2 per barrel, of 40 gallons It must be handled in tank cars, or boats, and never in barrels. The freightage will be as 1 to 3 in favor of benzine, as against ordinary coal, because one pound will yield at least three times the gas of ordinary coal. Supposing the cost of benzine four cents per gallon, delivered, and the daily make 100,000 cub. feet of pure gas; the account would stand about as follows:

Per 1,000 cub. feet.	Minimum.	Maximum.
Material	68.0	80.0
Labor	4.0	5.0
Repairs	2.0	2.0
Fuel	10.0	20.0
*Leakage	2.0	4.0
Total	86c	$1.11

* Leakage is brought in because there will be an immense saving in this item, as compared with coal gas.

This is exclusive of salaries, profit and loss, general and office expenses, lighting, and such accounts as would not differ much from cost of coal gas.

C.—COAL GAS.

Coal (per 1,000 cub. feet)	$ .76	to $1.00
Labor	.20	.30
Lime	.02	.04
Repairs	.15	.20
Leakage	.10	.15
Total	$1.23	$1.69
Deduct for coal and tar sold	.30	.40
Total	$ .93	to $1.29

Of course, these statements may vary greatly for different localities, but they will be found for the most part relatively correct; and where coal gas can be produced at a lower figure than above, naphtha gas could be still more cheaply produced. It must be remembered, however, that 1,000 cubic feet of naphtha gas is equal in illuminating power to 5000 to 7000 cubic feet of coal gas (18 to 14 candles,) or that it is more than double in yield and illuminating power to the celebrated "Boghead Cannel" that English gas chemists enlarge upon.

D.—The average monthly consumption during the first year in one city, having been $3.50; after fifteen years running, the average was $8.50, and it went up by regular gradations. There is no doubt, but that some such proportionate increase occurs in most cities, up to a certain point.

E.—The relative proportion of consumers and non-consumers, living along lines of pipes, of course, varies greatly, according to price of gas, means, etc. In all cities of the West of medium size, however, it would be a low estimate to assume that only one-third of the total illumination was from coal gas, and two-thirds from mineral oils; or, only one consumer to between five and ten non-consumers. There are two reasons for this; the first cost of gas fittings, and the cheapness of mineral oils. To introduce gas, even in the smallest way, requires an outlay of $50 to $60.

F.—In connection with the foregoing fact, and the proposed use of mineral oils, for gas manufacture; the plan of investment by the gas corporations in fittings, and renting them, could be revived with undoubted profit.

G.—The disproportion between outlay for naphtha and for coal gas works, of the same capacity, is very great; it may be roughly stated, in percentage of total cost, as follows:

	Coal.	Naphtha.
Street mains	40	30
Storage of gas	15	7
Storage of coal and materials	5	5
Distillation	20	10
Condensation, purification, measurement, etc	20	10
Total	100	62

This estimate shows greatly in favor of naphtha gas; but I have no doubt the disproportion would be actually greater, as no account is taken of cost of real estate, etc., of which nearly three times as much is required for a coal gas works

H.—The relative "danger" of the two processes, is only named because the naphtha process has been denounced by a certain set of simple persons as extremely and inherently dangerous. All practical gas engineers are well acquainted with the source and causes of most accidents in coal gas works. They arise most frequently through disproportion or complexity of apparatus, combined with inattention and stupidity of workmen. It may be taken as an axiom that, for every syphon, goose-neck, drip, tar pipe, or seal, rendered necessary, an additional, though slight, element of danger is introduced. It would seem that a process which essentially decreased the number of drips, seals, etc., would to that extent decrease the danger. The purifying room and its care has always

* As a "little joke," we might here suggest the question whether the consumers might not put the *tu quoque*. Do *many* gas managers desire or encourage the dissemination of advice or instruction regarding gas among consumers? We trow that the learned author may find himself in the minority here among his professional brethren.—H. W.

* In a later letter from Mr. EDGERTON, he remarks as follows: "Prof. SILLIMAN advises me of an unanswered objection to naphtha gas, namely, that Mr. ARMITAGE of Providence, found sulphur present by lead paper test. I must admit it had not occurred to me to test for free sulphuretted hydrogen, nor bisulphide of carbon, as the odor of naphtha gas is ethereal and pleasant, and not at all suggestive of sulphur. I cannot but think that Mr. A. may have applied the test near retorts when at too high a temperature. The carbon is not all deposited in the retorts, but is carried along as a fine impalpable powder of lampblack, and by opening a cock anywhere between retorts and meter, and blowing on a piece of white paper a black deposit of carbon ensues. Even when heat sare proper an amber color stain is made on paper, resembling lead paper just turning by sulphur. I will, however, give it a trial for sulphur compounds, as I have a Letheby apparatus for that purpose.

been considered as requiring considerable caution. The naphtha gas process dispenses with two out of three drips, goose-necks and tar drains, and also with a purifying house, and it is to be hoped that it will end the talk about bisulphide of carbon, for the removal of which processes have been imagined that would equal in cost a naphtha gas works.

I.—The synonyms of benzine "Out West" are "Rose Oil," "Petroline," "Danforth's Patent Oil." "Star Oil," "Aurora Oil," etc. The affix "oil" is preferred as embodying the greatest deception possible in the case.

J.—The characteristic odor of naphtha gas is slightly ethereal. The odor is raised as an objection; I class it otherwise. It is as well to be reminded of the escape of gas by a pleasant odor, as by a smell resembling a combination of rotten eggs and decayed cabbage. By "pleasant odor," I don't mean a veritable "Eau de Cologne," or "Violette de Parme," but simply an unobjectionable odor.

K.—Benzine is already an article of commerce, and is daily and hourly handled, pure and mixed, by more individuals in the United States than any one other article, except, perhaps, bread or knife and fork. The question then is, will it be more dangerous handled in bulk and by parties instructed and knowing its nature, than handled by women and children and others, deceived, perhaps, as to its true nature? The "naphtha" is eminently and above all a humanitarian process. A few (for a consideration) proffer their services for the handling of this dangerous article, to the safety of the many.

L.—Many contend that whatever there is of value in this process, it is nothing new, and, therefore, available to all.

The claims allowed Leonard D. Gale in patents No. 26,028–26,030, and reissued in 3,872 and 3,873, were quite broad, as follows: "The vaporizing of hydrocarbons below a red heat, and the decomposing them above a red heat into fixed gases," with various appliances for the effecting of this object. The assignees of these patents, together with improvements thereon, are Messrs. Brown, Rand and Nichols, who resurrected the thing and put it in successful operation in its present practicable shape. An inspection of the working of their apparatus must satisfy any candid man, that to their ingenuity and perseverance is due the tribute asked, and it would be well worth the time to pause and reflect before invoking the aid of courts of law against those who, it is apparent to all, have brought about these remarkable results, in the face of strong opposition and ridicule.

M.—The process is suitable and expedient for all gas works, new and old, large and small, to be used in connection with the old process, or alone, as circumstances of price to be obtained, etc., may dictate. It would be unreasonable to suppose that the process of coal distillation is to be cast aside, and the naphtha substituted, without reference to circumstances. Of this point we may rest assured; all will have to use it more or less, or else some other plan of enriching gas, which may in the end cost a great deal more. The change will, to a certain extent, be compulsory; those most careful and guarded against "Patent Rights" and "Humbugs" would feel a certain inquietude at the idea of competing, at the same price, with a gas of seven times greater illuminating power, and no plea of vested rights would hold in excluding the public wholly from the benefits of this process.

It becomes all, then, candidly and thoroughly to investigate this process, to decide upon its merits as adapted to their case, and to lay aside as much as possible all prejudices and previous impressions.

I have to express my great obligations for the kindness and courtesy of Mr. W. H. Fitch, Jr., manager of the Memphis Gas Works, as also to Messrs. Brown and Rand, who aided and seconded my efforts to see all the merits and demerits of their process; not forgetting Messrs. Duff and Tourtelette, the superintendents respectively of the coal and naphtha gas departments.

[To be continued.]

The Ventilating of Cellars.

Much has been said about the necessity of rendering the basement and cellars of houses sweet and wholesome; but, although this subject, which so intimately concerns our sanitary economy, has been before the public for years that need not now be counted, little progress has been made in attaining the wished-for end.

The cellar of a house may fairly be likened to the lower hold of a floating ship—the one being below ground, the other sunk in the water, and a like difficulty attends the ventilation of both; namely, the expulsion or extraction of foul air to be replaced by that which is pure, or as nearly pure as circumstances will admit. The first thought is that of the extraction of the foul air and it is one which has a claim upon science that has scarcely received that attention it deserves, although common sense ought to teach us that health depends upon it. Cellars are not always ceiled, and, even when they are, it is in such a coarse manner that the defense thus made against rising exhalations and the effect of a damp atmosphere upon the floor above must be very slight indeed, so porous is this rough coating of plaster. Some persons fancy that to flag or cement the cellar floor and walls is a preventive of noxious gases forming there. But this is a fallacy. It is true that such a treatment makes the cellar dry (provided the under drainage be perfect) and, to that extent, improves the atmosphere, yet still it has that death chill to be found in the subterranean tomb where decomposition reigns, and where, notwithstanding the stone surface surroundings and cemented brick-arches, damp settles and foul air is the only atmosphere. The lower hold of a ship is subject to a similar state of noxious air settlement, but both of those have a less influence for mischief upon human existence than has the cellar under the dwelling house, for the tenants of the latter are experiencing the injurious effects for a lifetime whilst the passengers and crew of a ship have the limit of a voyage to their experience, and the tenants of the tomb are past its influence. Now, if ship fever and many other malignant outbreaks of disease may be traced to this source, even during the comparatively short duration of a sea voyage, how much more to be dreaded and guarded against is the permanent evil arising from the presence of such a Pandora's box beneath our very feet, and sending up its subtle influences to undermine our existence?

As we have already intimated, the difficulty in remedying this necessary evil of cellars, lies in the perfect expulsion or extraction of the stagnant fœtid atmosphere, and this can be effected by either revolving fans exhausting a flue or flues, (either vertical or oblique) or by forcing-pumps, propelling fresh external air into, and thereby driving the foul air out of the cellar. There are other means, however, which we will suggest as eminently fitted for this pupose, always keeping in view the one great principle which governs or seems to govern, society—economy. The chimney being the indispensable feature of every house, the use of it as a means of ventilation is ever present. And, as heat is a conductor which can thus be made easily available, we have at once a solution of the problem of extraction in the simple addition of a continuous flue from cellar to chimney top, which may also have one of the simplest of the patent revolving ventilators, now in use, attached to it.

As an aid to this vertical ventilating flue, we would have another flue for the reception of external fresh air at the ground level which would supply the place of the retreating foul air and thus maintain a wholesome current; or, at least, a constant change of atmosphere. In order to build the chimneys to suit this principle of ventilation, it is only necessary to construct two flues four inches square, one at either side of the fire-places, and occupying a position in the chimney breast nearest the fire-place. The object in having two of these four inch flues, is to balance each other, and, at the same time, to give in the second one a very desirable servant in any household; namely, an ash-shoot, through an iron trap in which, located on a levet with the hearth, the embers, dust and ashes may be cleanly swept and be instantly precipitated to a receiver or close dust-bin in the cellar.

It would be very desirable to have both of these flues made circular, which could easily be effected by the mason using an open tin cylinder, with a handle at the upper end, by which he could draw it up as he proceeded with his work. Around this cylinder he should plaster close with lime and cement, in equal proportions, against three times as much sand. Of course, these flues may be square or even oblong, but, of whatever shape they may be, it is absolutely necessary that they be carefully pargetted or lined with plaster. This, in the one flue, prevents the lodgment of ashes on projections, the accumulation of which might eventually choke up the passage and destroy the efficiency of this useful labor-saver, and, in the other gives a freer passage to the ventilating draft.

A more expensive, but far more perfect method of ventilating cellars, would be to ceil over the whole space and place ventilating thimbles at intervals between the joists. In this way, the spaces between joists may be made to act as air tunnels, having grated openings in the external walls. In fact, there is no good reason for not so utilizing these joist spaces. In order to thoroughly purify the atmosphere of these underground rooms, called cellars, where a stream of water from a spring is available, a cemented drain, open on top, is excellent for the purpose, the current carrying off all mephitic gases and creating ozone, the purest of atmospheres.

Where a running stream from a pure spring cannot be had, its place may be partially supplied by the use of the hydrant at one end and a small pump at the other, thus letting the water in from the street in a continuous stream, running through the cement channel already spoken of and drawing it off at the other end, unless the sewer be below the bottom of the cellar, in which case, the pump is not needed. This artificial flow of water should take place twice each day—in the evening to cool the atmosphere, after the sodden effects of the day, and in the morning to clear off the exhalations of the past night. Have as many windows as possible and at as may sides as practicable, and let them be removable. There should always be an outer door, reaching to the very bottom of the cellar, and it, and the trap outside, should be opened as often as possible for the admission of air.

We cannot dwell too much or too long on this subject of ventilating cellars, for the neglect of such a practice endangers the health of a household. Every moderate dwelling has an inside cellar stairs with one door only and that opens directly into either the living room or the kitchen, so that if decaying vegetable or noxious refuse be there and ventilation be wanting, this door becomes a valve, through which, when open, the poisonous atmosphere escaped into the upper part of the house to generate disease, and who can say how many lives have been shortened through this one means alone?

The cellars of our houses are too much neglected because they are out of sight, and yet, much of the food we eat is stowed away there. Is it consistent with cleanliness, nay, with common sense, that such a state of things should be permitted to exist in any community where health is prized and long life looked for?—*Technologist.*

Testing Gas Meters.

The testing of gas meters is a very nice operation, and can only be properly performed by the constant observance of certain conditions. The instrument employed, called a prover, is a gasholder, inverted in water, and made to hold a given quantity of air, under conditions, hereinafter set forth, extracted from Harris & Bro.'s *Gas Superintendents' Pocket Companion.* The prover is constructed like an ordinary gasholder, but smaller, and it has a compensating balance, which adjusts for the variation in pressure, as the holder sinks in the water cistern. The conditions to be strictly observed are:

1st. The prover should be mathematically correct.

2d. For a uniform pressure from top to bottom, the meter prover should be carefully counterpoised and adjusted with a compensating balance.

3d. The air in the proving room, also the air or gas, and the water in the holder, should be kept uniformly of the same temperature.

4th. A thermometer in the air or gas holder, and one in the proving room, will always indicate the uniformity of the temperature, or any variation which arises.

Due attention being paid to these points, connect the meter to the holder. Then try your connections if they be tight. To do this, you require a pressure gauge between the meter prover and meter.

Place your hand tightly upon the outlet of the meter, turn on the air or gas from the holder, then turn it off, and if the pressure gauge stands at its initial point, you are ready to go on with the proving; after having brought the hand on the index of the meter to a designated point, the holder starting from 0, or any other fixed point, observe carefully these two points, the one on the holder and the other on the index of the meter. Thus prepared, turn on, to the meter, the air or gas from the holder, and make one or more complete revolutions of the pointer on the dial always stopping exactly on the point started from.

If the meter and holder exactly correspond, the meter is correct; if they vary, the percentage of error is easily calculated. To prove wet meters, the only additional observations are, to set them on a level plate and allow the water to run as low as it will from the water line or side screw—the true water level. Meters are usually proved under from 1 to 1½ inch pressure at inlet pipe, which should be well supplied with air or gas, and the outlet reduced to a given quantity per hour, according to the English standard as per table below:

The English standard of outlet openings, after testing, is as follows:

2	light	Meter	=	12	feet	per hour.
3	"	"		18	"	" "
5	"	"		30	"	" "
10	"	"		60	"	" "
20	"	"		120	"	" "
30	"	"		180	"	" "
45	"	"		270	"	" "
60	"	"		360	"	" "
80	"	"		480	"	" "
100	"	"		600	"	" "

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Eds.

[Written Expressly for this Journal.]

Peat—Methods of Preparation, Primitive and Modern.

BOSTON, April 10, 1871.

Messrs. Editors: Many of the products of the earth, which kind nature affords us, are known to have been used among the rude nations of antiquity, as among all uncivilized people of the present day, with little or no preparation; but to meet the requirements of civilized man, few if any, are considered to be in condition for consumption or use, except after the bestowment of labor in some form, either to change the shape or modify the character of the material, by mechanical or other treatment; and to this general rule, the material of which we are treating is no exception.

Undoubtedly the earliest use of peat for fuel was in its crude shape, just as cut from the bog and simply dried, without other treatment; and even now it is in this condition that it is used more than in any other, though it is nevertheless apparent that from very early days, attempts (some of them very rude), have been made to improve its condition.

An indication of this is furnished as early as the days of Pliny, who wrote that in Germany the people "pressed together with their hands, a kind of mossy earth, which they dried by the wind rather than by the sun, and which they used not only for cooking their food, but also for warming their bodies." Very little substantial progress has been made, however, in the character of the fuel as prepared for use, from that time until within a very few years of the present.

While it is my purpose to describe the present perfected methods of treatment, and state something of the characteristics of the fuel produced, and the uses for which it is adapted, the story would be still incomplete without some description of the earlier methods of preparation, and the various devices for manufacturing, solidifying and producing the material in form and of consistency desirable for transportation, traffic, and use, which have, from time to time, engaged the attention of practical and scientific men, both in Europe and in this country.

The most common method of excavating and preparing peat, pursued for centuries in Europe, and in numerous places in this country, almost from the date of its earliest settlement, has been somewhat as follows: After removing, to the depth of 6 to 10 inches, the surface layer, or turf or growth of vegetable matter still undecomposed, the pure peat is revealed and is excavated or cut out in blocks of nearly uniform size, by means of a kind of spade known as the *turf knife* or *slane*, which has a blade about 15 in. long by 4½ broad, with a wing on the side bent at right angles to the blade so as to form and cut, with the latter, two sides of a square. With this the peat is cut out and removed from the bog, in long square blocks, corresponding with the dimensions of the spade, and laid upon the sward, where it looses its water, partly by infiltration into the soil, and partly by evaporation. The tool is worked by the arms alone, and each block is cut at a single motion. The blocks are turned at intervals and haked or cobbled up in such a manner as to expose them most freely to sun and air, and when dry are found to be reduced very materially, both in size and weight, and to have acquired a good degree of consistency and strength. They usually remain exposed in this manner, from four to eight weeks, and are then housed for use.

Some peats, however, are exceedingly friable and if submitted to the treatment described, would not retain their consistency when dry, sufficiently to be handled. Others, excellent in quality, but not favorably located for drainage, are so moist and soft as to be raised only by dredging or scoops. The treatment of both of these is similar. The material is spread upon the ground to the depth of 6 to 12 inches, then, by harrowing, raking, working over with hoes, shovels or other implements, or by the treading of men or animals, it is reduced to a plastic, homogenous mass, of about the consistency of mortar, in which condition it is spread, to a uniform thickness of about four inches, cut or marked off into blocks of convenient size and shape, by an iron blade or a sharp stick, and left to dry; the result being that as it dries, the blocks separate on the lines of the marks, and a material of considerable consistency is produced, which in the course of four to six weeks may be housed for use. The treatment in this country has generally been accomplished by the hoe, rake or harrow, but in Europe principally by treading, and this mostly by women and children, who attach to their feet boards about 6 inches broad by 12 to 15 inches long, and thus equiped, pursue their tedious avocation for days and weeks together.

Another simple process, quite common in Ireland and Holland, is to take of the material, after having been treated in the manner above mentioned, a mass, in bulk equal to a brick, and still further kneed and manipulate it by a rapid motion of the hands, easily acquired and practiced, finishing by forming them into blocks resembling our large rolls of bread, which are then dried and stored. This is called "hand peat" and is considered preferable to either of the other kinds.

Mountain peat, of which we have but very little, in this country, but which is not unfrequent in the highlands of Scotland and in some parts of Ireland, is ordinarily of greater density than peat from the lowlands or bogs. It is cut from the hillsides in much the same manner as already described, though generally in broad flat slabs instead of the long square blocks, and is exposed and cured in the same way.

All peats improve by age, and with those who produce large quantities, the custom prevails to lay in a large stock, so as to be able to sell only from that which has been housed several months.

The merits of peat as an article of fuel, even in the rough condition described, have often attracted the attention of practical men, and have many times given rise to the enquiry if it were not practicable, by some means, to condense it into more solid and uniform shape, thereby better fitting it for use and as a merchantable article of traffic. This in turn, has invited the attention of theorists and inventors; to how large an extent it would be difficult to say, but the number of patents relating to it may possibly serve as some indication, though of these I can give no exact report. I have, however, personal knowledge of upwards of 80 in Great Britain and Europe, while in this country they number nearly if not quite 100 more.

The history of many of these inventions and the experiments leading to or consequent upon them are not without points of much interests in connection with the peat fuel enterprize; and although until quite recently none have proved practically successful, they have all tended to contribute something toward the general stock of knowledge available to us of the present day, and are therefore perhaps not wholly useless. They have taken a wide range, from practicable to impracticable, with manifold combinations of the two, in various proportions; some ridiculous in the extreme, while others have shown large measure of "inventive genius and combining skill," failing only of attaining the desired result by some difficulty apparently insurmountable, but in reality trifling, the remedy for which a better comprehension of the character of the material might have suggested or a step further in practical experience might have disclosed.

Most who have undertaken it have thought the thing easily accomplished, until they had gone as far as wits, funds, courage or patience, without much of practical personal attention would permit; while not a few have thought to make quick work of it by renaming, or at most re-vamping some one of the numerous brick machines, tile machines, sugar-mills, hay and cotton presses, meat-cutters, vegetable strainers, quartz crushers, and other apparatus, the product of other mens' ingenuity, constructed for other purposes but not adapted for this.

A few only, of the machines so devised, have been actually built and operated, some with good measure of success, others at loss. Some have been constructed upon principles entirely at variance with the character of the material to be treated or the results to be obtained, while many have made a fair commencement, gone so far and just stopped short of the one or two steps more which might have shown a good degree of success. A good many have gone over one or the other of about three well beaten tracks, seemingly unconscious that others before them had pursued the same course, and that without some deviation from it they must inevitably stop at just about such a point and fail of success. A little time spent in obtaining information would have saved much time, labor, vexation and money, and in some cases would probably have led to fair measure of success and profit instead of failure and loss.

Most of this has transpired within the last fifty years, and notwithstanding repeated failures, there has ever been partial success; the actual results of all well conducted experiments tending to show that the thing was entirely practicable and that when accomplished the numerous deposits of peat, hitherto considered of trifling value would have an actual and acknowledged importance fully equal to forests and coal-fields.

The probability of a supply of good fuel at low rates, from a newly developed, wide spread and abundant source, is matter of quite too serious importance to sober minded men to pass without investigation, when attention has once been fairly directed to it. Fuel consumers look with favor upon and urge the prosecution of the enterprize, and that too, with increasing good will, convinced as many are, by their own observations on the merits of the fuel which it is now found practicable to produce.

The properties of peat for fuel have long since been determined, and are now unquestioned. The object of mechanical treatment has been to solidify and strengthen it, and that for a two-fold purpose; First—in order to produce a more dense and harder fuel, which should therefore be more enduring in service, and capable of being employed in manufactures and in the arts and elsewhere, under blast or otherwise, where a soft, light fuel would be entirely unfit for the service required. Second—in order so to reduce its bulk as to admit of transportation as an article of traffic.

Of the various methods devised, nearly all may be resolved into one or the other of three, as follows: First—to place the peat, just as it comes from the bog, under powerful pressure, for the double purpose of extracting the water and solidifying the mass. Second—to dry and disintegrate the peat and in that condition to compress it into blocks of convenient size for use: Third—to work, kneed, grind or temper the mass (in the moist condition in which it is taken from the bog) until it is .educed to a somewhat uniform degree of consistency, (in many cases introducing into it an additional quantity of water,) until it is of the consistency of mortar or thinner, and in this condition spreading it in the open air or otherwise, to dry; various means being adopted for cutting or molding it into blocks of size and shape convenient for use.

The first of these methods fails from the fact that the *air* contained in the tubes and cells of the peat, instead of being driven out, is, immediately on the application of pressure, sealed even more closely in those cells, and the pressure takes effect only on that, the solid matter and the water being alike incapable of compression, while as is well known, the air is highly elastic. The consequence is that if pressed in a tight box or mold, on removing the pressure the air-cells again expand and the mass resumes nearly its original dimensions, and when dried is found to be still porous and even more friable than when dried without having been submitted to pressure.

The second method involves the necessity of expensive and very powerful machinery, with frequent renewal of some of the working parts. The product, in some cases, has been very hard and generally attractive in appearance, but the material of which it is composed being dry and neither plastic nor adhesive, the particles are compacted only by force of mechanical pressure, and the blocks when placed either in water or the fire, become quickly and finely disintegrated, so that the fuel is likely to be spoiled and rendered entirely unfit for use by exposure to rain, and is practically useless for many of the purposes for which fuel is required, from lack of cohesion, or the fact of its rapid disintegration while burning. The process has in all cases proved to be too expensive to warrant its use, and is now, I believe, entirely discarded both in this country and in Europe.

The third method, under various modifications, is the one now generally in use, and produces by far the best fuel of either of the three methods. It is applicable to nearly all the varieties of peats and produces a fuel having strength and solidity to a degree which is not obtained by either of the other methods. Moreover it is observable that it is identical in character with the primitive methods of preparation before refered to, by which their best fuel "hand peat" was produced; that being in fact, the early development of a process which we of the present day are perfecting and to which we are adapting the more complete, uniform, and effective treatment of mechanical appliances.

I have yet to describe the perfected process and machinery which is now successfully adopted, but have already trespassed too much on your space, and must therefore let this pass for only half a letter and send the remaining half in season for your next issue.

Very Respectfully,

T. H. LEAVITT.

Answer to "X" on Dip-Pipes,

PHILADELPHIA, April 6, 1871.

Messrs. Editors: Your correspondent "X," in your issue of March 16th, says very truly, that the explanation given by "W," in a former number of the Journal, may not fully explain the reason why the Gibson Improvement being substituted for the dip-pipe, prevents the formation of fixed carbon in the retort; but he has omitted to mention all the reasons why the dip-pipe causes a greater pressure upon the retort than would at first be supposed.

Not only is the gas in escaping from the retort required to displace a column of liquid much heavier than water, but this liquid (*coal tar*) becomes thickened in the main, and often forms solid masses which clog the dip pipes. While the most liquid portion of the tar flows from the outlet of the main at the water line, the remainder becomes, more or less, semi-fluid and glu-

tinous, presenting a much greater obstruction to the free passage of the gas than the mere hydraulic pressure of a iquid like water, though of the same specific gravity as coal tar. Y.

Answer to John Keeling on Dip-Pipes.

NEW YORK, April 11, 1871.

Messrs. Editors: In reply to Mr. Keeling's communication, in the last number of your Journal, permit me to say, that in my communication of March 2d, to which he refers, I did not assert that there was not more force exerted by the assumed flow of water than by the ordinary flow of gas from a retort. He takes exception to my illustration, on account of the "*difference of force of the two things*," and at the same time, for his own illustration, he says, "*a gas retort may be put in the same category as the boiler of a steam engine.*"

Whatever may be the fluid flowing from one vessel into another, the resistance it encounters causes some degree of pressure, and this pressure may be constant, or it may be intermittent. In the case of the dip-pipe it is intermittent, and differs in this respect from the pressure between it and the gas-holder, and however great or small may be the force required to overcome it, if avoided, the result is a gain of too much importance to be unheeded.

It is true that there are various causes which affect the accumulation of carbon in gas retorts, such as temperature, quality of coal, etc.; but when it has been found that with retorts of uniform temperature, charged with the same kind of coal, and all other circumstances as nearly the same as possible, excepting only the dip pipes, that there is a marked difference in this respect, to what else can we attribute it, and how is it to be explained? W.

General Views of an Engineer.

NEW YORK, April 12, 1871.

Messrs. Editors: Your valuable paper from time to time fully explains new methods and processes of making illuminating gas, and more or less recommends their adoption.

There is, however, sometimes one very important consideration overlooked. Speaking, perhaps, somewhat generally, there are few gas works similarly situated as regards first cost of coal, the character of the coal most accessible, and freight from the mines to the works.

Again, even in neighboring cities, the market value of coke and other products varies considerably, and I know that in some, the adoption of change under which a greater number of cubic feet of gas could be obtained at diminished cost, would result in a loss, by reason of a diminished return from the sale of the residuary products.

The question of economy is the all important one, and we have yet something to learn as to the financial aspect of the use of liquid hydrocarbons either alone, or in connection with coals of superior gas-producing quality.

Yours, etc.,
ENGINEER.

A New Gasometer for Springfield, Mass.

We learn that Mr. Thos. F. Rowland, proprietor of the Continental Iron Works, Greenpoint, L. I., has recently designed and built a double-lift gasometer for the gas works at Sringfield, Mass. It was supervised by Mr. George Dwight, who, besides being a stockholder in the company, is the managing director and one of the ablest gas-engineers in the country.

The dimensions of this gasometer are as follows;

Diameter, inner section	80 feet
" outer section	81½ "
Total lift	40 "
Capacity	205,000 cubic feet.

The crown on top of the holder is made spherical or convex in form, to secure greater strength. Where gas-holders stand (as is usual in the neighborhood of New York) in the open air, much trouble arises from falls of snow, etc., which increase the pressure. For this and other reasons it is common in New England and universal in Europe to enclose the gasometer in a building. This is the plan adopted at Springfield in the present instance. A building of circular form, ninety feet in inside diameter, with a conical roof, surmounted with a central cupola, encloses this gasometer, and confers upon it both sightliness of appearance and complete protection against wind and weather.

The frame for this holder is made of cast-iron, and consists of eight sets of columns. The columns are in three lengths, having two intermediate entablatures, and surmounted by an ornamental entablature, on which are bolted the frames for the wheels over which the counter-weight chains run. The girders for connecting the heads of the columns and tying them all together is formed of four wrought-iron pieces, each one quarter cylindrical in section, strutted apart by cast-iron thimbles, thus making it deeper and wider in the centre and gradually diminished at the ends; thus making a light, strong girder. This is an invention of T. F. Rowland's and is conceded to be superior to the ordinary lattice style.

The height of the whole structure is 45 feet. It reflects great credit upon the ingenuity, taste and mechanical ability of its designer, though it is not by any means the largest of his gasometers. That of the New York Gas Company, for instance, (which Mr. Rowland built,) is 168 feet in diameter, and contains 1,500,000 cubic feet of gas, and has wrought-iron columns and girders.

The Late Mills L. Callender.

At a recent meeting of the National Coal Gas Company, the following resolutions were adopted:

Resolved, That it is with great sorrow we record the death, on the 21st day of February last, of our late Secretary, M. L. Callender. Esq., who, though for a long period thereto, prevented by ill health, and loss of hearing, from performing the duties of Secretary, yet always retained the esteem and confidence of the members of this Board.

Resolved, That we deeply sympathise with his bereaved widow and little child in their heavy affliction.

J. R. WHITING, JR.,
Secretary, *pro tem.*

Who Invented Safety Valves.

It is usually supposed that the Frenchman Papin was the inventor of the safety valve, which he first applied about 1682 to his digester in such a way that it was kept closed by a lever and movable weight, so that the pressure on it could be varied by sliding the weight along the lever; in this way he kept the valve in place, and could regulate the steam pressure, so that it would not surpass the limit to which the valve was charged.

It appears now that Papin was only the inventor of the improvements just mentioned, but that fifty years before, the German, Glauber (who contributed many valuable additions to the mechanical department of chemistry) used safety-valves. In his treatise on philosophical furnaces, translated into English in 1651, he describes the modes by which he prevents retorts and sills from bursting from an excessive pressure. A conical valve was fitted, being ground air-tight to its seat, and loaded with "a cap of lead," so that when the vapor became too "high," it slightly raised the valve and a portion escaped; the valve then closed again of itself, "being pressed down by the leaden cap and so kept close."

The idea was followed up by others, and we find in the *Art of Distillation*, by John French, published soon afterward in London, the following concerning the action of such safety valves: "Upon the top of a stupple (valve) there may be fastened some lead, that if the spirit be too strong, if will only heave up the stupple and let it fall down again."—*Manufacturer and Builder.*

The Reveune of the Patent Office.

For several years past, the funds received at the Patent Office, from inventors, for the transaction of their business, have been, by act of Congress, turned over to the Treasury, and the Patent Office sustained by specific appropriations, made yearly for that purpose. We desire to call attention to the injustice and unfairness of this matter. The Patent Office is not only a self-supporting office, but its revenues are large and flourishing, and steadily increasing. Transferring to the Treasury, the moneys received by this bureau from inventors and other applicants for patents, is raising revenue from a source whence it should not be done; while appropriating from the Treasury to sustain the Patent Office, tends to create the impression that it does not support itself.

The money paid to this office is not a legitimate source of revenue to the Government. It comes from individuals, and is paid into the exchequer of the Patent Office for a specific purpose, that of facilitating the business of these individuals. It is unjust and unfair to divert a cent of it for other purposes. In our opinion, all the moneys received at the Patent Office should be used solely to carry on the business of that office, and to give increased facilities for the transaction of that business.

As the law now stands, we apprehend there is more of delay and obstruction in the despatch of current work in this office, than there should be. The office is crowded for want of room, and inventors are compelled to wait for months ere their affairs are brought to a final and successful termination. The Commissioner of Patents and his entire force of assistants devote themselves with unusual and most commendable energy and faithfulness to the prompt and speedy performance of their duties, but they find it a matter of impossibility to proceed as fast as they desire, and as rapidly as the necessities of the work demand.

Every application for a patent, or claim for an extension, etc., should be made almost immediately upon its being filed in the Patent Office, thereby assisting inventors and tending to increase the business of the office. If the Commissioner of Patents were empowered to retain and disburse, as the necessities of the office demanded, the moneys received therein, the speedy transaction of business would be insured. And we think Congress should look into this matter, and to change the present mode of transferring Patent Office funds to the Treasury. Its revenues should be expended solely upon itself, and should not be diverted to any other purpose whatever.

[We copy the above remarks from the *Republican* (Washington city), and are glad to find that influential journal interesting itself in Patent Office reforms. The suggestions are worthy of consideration.]

Malt Without Germination.

The process of malting, as is well known, consists in steeping barley in moisture till germination has commenced, and then roastir g the malt to arrest the growth. When done, the product easily yields, to water, a sacharine principle, making a sirup or "wort," easily fermentable; and when fermented, giving a large proportion of alcohol. The time taken in malting, and the troublesome nature of the somewhat delicate process, has led many chemists to search for means of producing a wort artificially, but as yet the organic matter has defied synthetical imitation. But a new invention is announced, by which a wort can be produced from barley, without germination.

The process is as follows: The barley (fifty parts by measure) is put into a vessel, and steeped in thirty parts of sulphuric acid diluted to one per cent; the vessel is then covered lightly, and placed in a water bath, kept at a steady temperature of 105° Fah. The vessel must be left in the water bath for seventy-two hours, and the contents frequently stirred to insure contact of the acid with all the barley. At the end of the process of steeping, the barley becomes soft and easily crushable, the silica in the bran being destroyed by the acid. It should be dried, and then has the appearance and smell of malt, and, we are assured makes an excellent wort.

The saving of time and trouble are altogether in favor of this process, which the inventor, Dr. Fleck, of Dresden University, has lately discovered, and on which he is now laboring with a view of rendering it easy and practicable on a large scale.—*Sci. Am.*

KITCHEN BOILERS.—An English cotemporary, the *Ironmonger*, speaks deprecatingly of the small amount of ingenuity devoted to the construction of kitchen boilers, and this is an age which has improved almost every article of use in the household. Selecting from a list of boiler accidents, more or less disastrous in result, we find a case of fatal explosion of a boiler, the bursting taking place in consequence of the pipes being frozen. A simple and intelligible occurrence, certainly, and, consequently, easy to be prevented. The blame is due to the builder who put up, and the maker who constructed, the infernal machine. No boiler should be made without a safety valve. A pressure of steam is always useful, especially where hot water is forced over a house; and those who have eaten potatoes boiled in a pressure of ten pounds on the square inch, will admit that it has value for culinary purposes. The valve should be fitted with an immovable weight, and then tampering with it, and all accidents to the boiler from bursting will be prevented.

Tests for Sulphur Compounds in Illuminating Gas.

The presence of sulphur componnds in crude illuminating gas is a well known fact. Iron pyrites is never wanting in any gas coal, and its sulphur becomes, under different forms, part of the gas. One of these forms, *sulphuretted hydrogen gas*, is completely removed by the purifying process, while others, like bisulphide of carbon, remain with nitrogen compounds, and give the gas that peculiar odor by which it may be so readily recognized. The presence of these sulphur compounds may be proved, according to Ulex, in the following different ways: If a platinum dish is filled with about a pint of water, and then heated over a Bunsen burner until the water is evaporated, a thick dirty liquid is observed on the outside of the dish, where it was touched by the flame, which consists of concentrated sulphuric acid. Another proof of the presence of sulphur in purified gas may be obtained from glass cylinders. After being in use for a little while, they turn white and become covered with a sort of incrustation, which can be washed off with water, and will be found to consist of sulphate of ammonia. Another astonishing fact is the following; If in a room one or more gas jets have burned two or three evenings, it is only necessary to rub with the finger several times up and down a window pane, and wash off the adhering particles with distilled water, when a solution is obtained which turns milky with chloride of barium, and red with mercuric iodide of potassium, indicative of the presence of sulphuric acid. If the windows of a room in which gas is burned are not washed for a week, thousands of small shiny crystals can be observed in the sunshine, which consist of sulphate ammonia, and having an acid reaction contain an excess of acid. The presence of the vapors of this acid-sulphate of ammonia is probably the cause of its being so difficult to grow plants in inhabited rooms, and which affects persons with sensitive respiratory organs, causing them to complain of dryness of the air, while, in reality, the amount of moisture is increased by the burning gas.—*Druggists' Circular.*

Touching off 5,000 Feet of Gas.—The Elm City (New Haven) *Press*, has the following item: On Sunday, 19th March, a number of boys were playing on the old gas-holder in Fair Haven, out of use for over a year. The capacity of the holder was about 40,000 feet; but at this time there were only about 4,000 or 5,000 feet of gas in it. John O'Brien, aged 15, opened the man hole, and proposed to light the gas. One of the boys warned him of his danger, but O'Brien replied that he would do it if he did get killed. He lighted a match and threw it into the hole. An explosion followed, causing a shock which was felt all over the city. Young O'Brien was thrown some thirty feet into the air, and fell, striking the heavy iron frame work and then the top of the holder; he was instantly killed. The holder was tipped toward the west, and the body rolled down nearly to the edge, a stream of blood marking its course. Two spans of the iron frame work were broken and thrown to the ground by the force of the explosion, the rivets of the holder were nearly all torn out, and the holder itself was blown into a shapeless mass. The other boys, it is supposed, got out of the way before the explosion, though fears are entertained that one or two may have been blown into the river.

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On granting the Extension	50
On filing a Disclaimer	10
On filing application for Design (3½ years)	10
On filing application for Design (7 years)	15
On filing application for Design (14 years)	30

RECENT AMERICAN PATENTS.

Pertaining to the Specialties of this Journal, the for three weeks ending April 8, 1871.

112,786.—Coating Gas and Water Pipe.—Nicholas Clute, Schenectady, N. Y.

112,820.—Peat Machine.—Herman Mielisch, Racine, Wis.

112,853.—Steam Engine.—Stephen P. Ruggles, Boston, Mass.

112,899.—Valve Gear for Steam Engine.—A. S. Cameron, New York city.

112,968.—Pipe Coupling.—J. B. Ramp, Cuyagoga Falls, O.

112,975.—Gas Machine.—T. G. Springer, St. Louis, Mo. Antedated March 10, 1871.

112,981.—Hydrocarbon Gas Apparatus.—M. H. Strong and W. I. Reid, Brooklyn, N. Y.

112,992.—Meter.—Franz Wagner, New York city.

113,005.—Rotary Steam Engine.—William Barry, Carthage, New York.

113,021.—Condenser for Steam Engines.—William Craig, Newark, N. J., and H. L. Brevoort, Brooklyn, N. Y.

113,037.—Water Grate Bar.—Wm. A. Farris, Cairo, Ill.

113,052.—Tubular Steam Generator.—Jas. M. Hicks, New York city. Antedated March 11, 1871.

113,069.—Steam and Water Pressure Regulator.—N. C. Locke, Salem, Mass.

113,132.—Double Acting Force Pump.—Jeremiah Barney, Perry's Mill's, N. Y.

113,162.—Water Meter.—T. C. Hargrave, Boston, Mass.

113,167.—Machine for Forming Pipe Elbows.—Chas. Hoeller (assignor to himself and H. S. Hoeller) Cincinnati, O.

113,192.—Producing Gas from Hydrocarbons.—Xavier Mousard, Paris, France.

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[Reported Expressly for this Journal.]

April 17, 1871.

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American Cannel Coals.			
Peytona of West Virginia			$13 00
Darlington of Pennsylvania			— —
Asphalts.			
Albertite of New Brunswick	$16 00	@	17 00
Ritchie Mineral of West Virginia	— —	@	15 00
Trinidad Bitumen	— —	@	14 00

Absorption of Gas by Iron.—According to M. Jacobi, of St. Petersburg, iron obtained by galvanic deposit possesses the peculiarity of being so hard as to scratch glass, and to be very brittle; but when heated itt color becomes deeper, its hardness and brittleness are lost, and its specific gravity considerably increased. This fact led the experimenter to believe that the iron, as at first deposited, might contain gas in its substance; and on heating a small quantity carefully, nearly eighteen volumes of gas, chiefly hydrogen, were driven off and collected.

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☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

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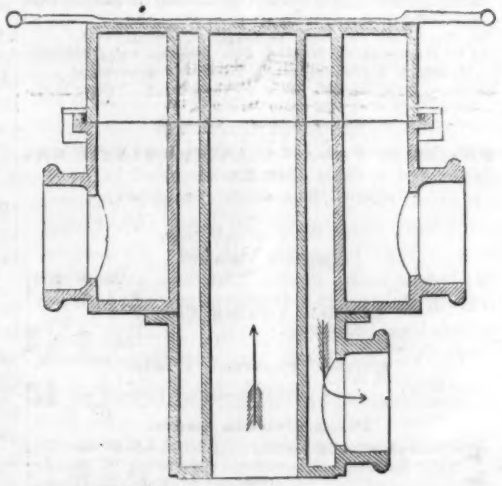

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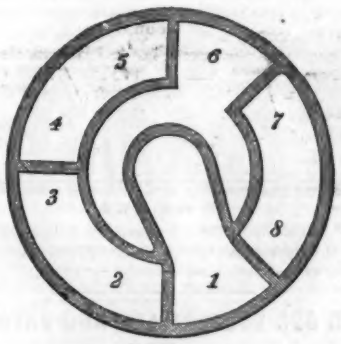

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CONSULTING CHEMIST, GEOLOGIST AND GENERAL SCIENTIST—
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

MONDAY, APRIL 17, 1871.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subject to which its colums are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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General Editorials.

ELECTRO-MOTIVE FORCE.

Under the above caption appeared in our last issue an editorial, which calls for both disclaimer and rejoinder on the part of the undersigned.

The readers of this Journal are doubtless well persuaded that the present writer is sufficiently optimistic in his views of future human progress and achievement; but that there has been put within our grasp a "power capable of indefinite enlargement, without increase of the initiative agent," as conjectured in the note referred to, is a proposition so stupendous in its sequences that he cannot allow its suggestion to rest under the sanction that would be implied by silence on his own part. At the same time it is not altogether to be regretted that the topic has been introduced into our columns, as there are doubtless many among our readers who are thinkers upon this topic, without possessing the opportunities or the time for such investigation as is needed to test intellectual vagaries of this sort. It is true that our space is much too scant for the matters of immediate and pressing *practical* importance which crowd upon us, and at the present we cannot admit any such thing as an extended discussion on speculative subjects. In this instance it happens most fortunately for the saving of our own time and space, that one of our American Scientific contemporaries has. in a few terse sentences condensed views which fully represent our own, so to speak, "in a nutshell." We quote therefore from the *Jour. Franklin Institute*, an editorial of Prof. MORTON'S; adding the remark that the reverend gentleman who has been endeavoring to reconstruct our theories of motion and force, "still lives"; and, with a persistence worthy of a stronger cause, is still engaged in putting forth what he clearly believes to be crushing counterblasts to his antagonists. Should it yet prove that we are all blind, and that his eyes are open, the fame of the Reverend (and doubtless sincere and amiable) Mr. HIGHTON will, in the future of our race, so far transcend that of GALILEO, as the heavens are above the earth. The Epimethean era of the earth will end. Prometheus will not be much longer "vinctus." Pandora's box will close again. Poetic pæans will turn out to have been prophetic.

"Lo! I see long blissful ages, when these mammon days are done,
Stretching like a golden evening forward to the setting sun." H. W.

"THE MAXIMUM OF MAGNETIC POWER EVOLVED BY A GALVANIC BATTERY.—A curious succession of papers on the above subject has appeared lately in the *Chemical News*, from the Rev. H. Highton, in which that gentleman attacks no less important a principle than the conservation of force, and maintains no less difficult a thesis than the possibility of what is technically called perpetual motion, or the development of power without a corresponding expenditure of force. The subject would hardly be worthy of our notice but that, strange to say, these opinions have gone, so far, unchallenged in the pages of our learned contemporary, and, in connection with schemes alluded to in another item on galvanic motors, seem to have led astray some investigators.

"The theory of the daring author above named, is briefly this: A battery current, passed through a given electro-magnet, will lift a given weight, *f*, now, we double the cross section of the wire of the said electro-magnet, and also its length, the resistance of the circuit remaining the same as before, the current developed by the battery and the consumption of zinc will remain as before, and yet the lifting power of the magnet will be doubled. Or, in place of increasing the size and length of wire, several similar electro-magnets may be so introduced in the circuit as to produce the same effect. Such a process continued indefinitely would, of course, enable us to develop any amount of magnetic force from a given battery.

"So far, well; but we have not yet come to the development of power, which implies motion. For this, it is evident that the electro-magnet must be charged and discharged, and here comes the compensating condition. To charge a *double length* of wire will take just *twice the time*, and therefore cause a *double expenditure* of zinc in the battery.

"Our author, in fact, notices this, but remarks that 'the electric current is so rapid that this difference of time is inappreciable within any practical limits.' Without doubt, to advocates of perpetual motion, but not to those who can see that two millionths of a second are as much twice one millionth as two centuries are twice one; or to the zinc, which, having to work twice as long at each effort, will be doubly exhausted when a given number of actions has been completed."

GAS METERS.

It is no part of our present purpose to discuss the relative, or actual merits of wet and dry meters. Their principle of action. and the skill bestowed upon their mechanism, will be referred to in general terms hereafter. Such references, however, will be incidental rather than direct, and will not in the remotest degree point towards meters made by any particular person.

A great deal might be said about meters; their early history, the ups and downs which have attended them, their failures and successes, and the triumphs which patience, and courage, and perseverance have achieved, but it would be sure to divert attention from what just now is of great importance, namely, gas meters, in their practical and commercial aspects.

During many years past the wet meter had the field of operations to itself. Never was any machine more used or abused. In its younger days it had to struggle with prejudice, ignorance and misrepresentation. When it grew older its course was not much pleasanter; for on the introduction of its rival it was accused of offences of which it never was nor ever can be guilty.

Doomed to labor almost unknown and unnoticed, in dark cellars and out houses; in kitchens and areas, the meter has always been an object of aversion and undeserved suspicion. But it is the best friend which gas companies have ever had. The benefits it has conferred on them. and on society in general, are beyond all calculation. No language which we can employ will sufficiently proclaim its praises. In extending the uses, and in simplifying the applications of gas, the meter has no equal.

These things are not sufficiently understood, or if known and understood but seldom acknowledged. There are many houses where a gas meter has been at work for years. As long as everything connected with the gas-lights has gone on pleasantly, no notice has been taken and no inquiries made about the careful accountant. Let the supply of gas be deficient. the lights burn unsteadily, or suddenly go out, or let the rate of consumption be a little greater than ordinary; or the meter, by long continued hard work, have some part of its mechanism deranged or worn out, and its past services and uniformly good behaviour are instantly forgotten. Listen to the abuse it receives. One would snppose it had always been ill-behaved—always troublesome—always unfaithful.

Weighing and measuring, according to local or general customs and the nature of the commodities, are so well understood, and so necessary between buyers and sellers, that they need only to be mentioned to illustrate the principle to which the meter is applicable. There is nothing mysterious about it. Simplicity and fidelity are its most remarkable properties. It differs from ordinary measures of capacity in its form and in being self-acting, but it is just as much a measure as the commonest of them.

Nor is there any uncertainty in the operations of a gas meter. Properly adjusted and fairly

treated, it is preeminent for accuracy, greatly surpassing all ordinary kinds of measures. Look at pint or quart measures for milk, or beer, or smaller or larger measures for wines, spirits or oil; or look at the measures, and the methods of using, employed in the sale of a hundred other articles in daily, hourly demand. Are such measures (standards as to legal accuracy though they may be) deserving the name of standards of perfection in their uses and management? It is impossible to fill and empty ordinary measures without error or waste.

It has become so common a practice to find fault with gas meters, that many persons, who ought to know better, are guilty of it. If a small portion of the time spent in grumbling had been devoted to a careful examination of the principle and mechanism of these useful instruments, there would be fewer complaints. Knowledge inspires confidence. All that need be known could be acquired in a few minutes, and then everything would be intelligible; and because understood, perfectly simple.

We shall now proceed to show what a meter has to do, and how it performs its duties. Attached to the pipe through which the gas passes to the premises of the consumer, the meter acts as a sentinel; guarding the passage so as, on one side, to protect the consumer, and on the other, the gas company. It is under the control of the consumer; working or standing still, moving quickly or slowly, entirely at his bidding. The consumer receives no gas without its first passing through the meter. In so passing it is measured, and the quantity recorded. Never was there a happier thought or a more wonderful contrivance; an impartial witness to the transaction between buyer and seller, and an accountant whose honesty cannot be impeached. All this seems easy enough to think and to write about, when the process is understood, and when what is going on inside a meter is so present to the eye of the mind, as its external parts are visible to the bodily eye. Here is the chief difficulty. A mystery has been made, or pretended to be made, of what is no mystery at all; while those who ought to have taken most pains to make the principle and the merits of meters known, have shown the greatest unwillingness to do so.

We shall refer to this subject in a future issue, and lay before our readers the merits of the wet and dry meter.

PRACTICAL HINTS ON GAS BURNERS, FOR CONSUMERS.

The question has often been asked us, which is the best and most economical burner to use. For general purposes, the most useful burner is the Argand; and of the various sizes the most economical is the 15-hole. With this burner the gas is consumed under the most favorable conditions of which it is susceptible; and hence the light obtained from a given quantity of gas is greater in proportion than by any other means. The principle of the Argand burner consists in admitting a current of air simultaneously to the interior and exterior surfaces of a (hollow), cylindrical column of gas, and the most beneficial effects are obtained, when the quantity of gas so supplied is sufficiently controlled that it causes perfect, but not vivid combustion.

Some of the burners that have lately been brought into notice are inferior to the common argand as regards the economization of gas. Others constructed with the intention of producing vivid combustion, by deflecting a current of air upon the gas flame, are well adapted for situations where a brilliant light is required to a limited space, and where a good supply of fresh air can be obtained. They ought not to be used in private or other closed apartments, unless there be free ventilation. However varied the forms or the names of burners, there is no very wide range in the application of the principles. The more tranquil and perfect the combustion, other conditions being equal, the greater the quantity of light from a given quantity of gas. The more intense the combustion, the greater will be the quantity of gas consumed, and of heat generated, to produce an equal quantity of light. To some persons these latter conditions will be of no importance. We only remind them, if they complain of heat, the gas is not to be blamed, but the burner.

Exaggerated statements as to the economical effects of certain kinds of burners are put before the public with the semblance of truth. These must be received subject to large deductions. Carefully and delicately-conducted experiments are very different in their results to the hard, rough practice of every day life. We desire to give every encouragement to improvements; but mere alterations do not always deserve the name of improvements.

Next in order to the argand burner, for cleanliness and economy, is the fish tail, which is very extensively used, and when enclosed in an appropriate glass has a very pleasing effect. It is applicable to small rooms, passages, entrance halls, and front door lamps. In almost every house there are particular situations where a light will be a great convenience, but when the least possible quantity will suffice for all useful purposes. In such places a single jet burner will be most appropriate, which, with careful management, will yield light equal to that from a candle at a small cost.

Our limited space will not permit us to give a more lengthy article on the qualities of other burners now in use, but will at future time continue the subject.

☞ We learn that the contract for the erection of Holly Water Works buildings in Ironton, Ohio, was awarded, on the 17th March, to R. T. Coverdale, of Cincinnati, at $58,786. This includes the putting down of three and a half miles of the mains, the work to be completed by the 1st of October next; the machinery to be furnished by the Holly Manufacturing Company, at a cost of $36,200, and is to have a capacity of two million gallons each twenty-four hours.

Answers to Correspondents.

M. T. of Pa.—Anthracite coal contains more carbon and less hydrogen and oxygen than bituminous or cannel coals. It also contains a much less proportion of ash.

J. R. B. of O.—A number of small gas works, using only one bench of three retorts, employ clay, and they find no more necessity for the use of an exhauster than when using iron. The retorts of domestic manufacture we consider to be quite as good as those imported.

L. E. J. of Ind.—A gas manager ought to be pretty well educated to his business, and to understand the theory as well as the practice of gas making.

A. D. of Phil.—The burner takes its name from its inventor, Argand, who contrived his celebrated lamp toward the close of the last century. The chimneys originally used by Argand were made of sheet iron and placed above the flame.

D. L. P. of N. J.—Hydrogen gas conducts both heat and electricity better than any other gas, resembling the metals in this respect.

Prof. Henry Wurtz,

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[Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas and Coals. Formerly Chemical Examiner in the U. S. Patent Office. Practices as

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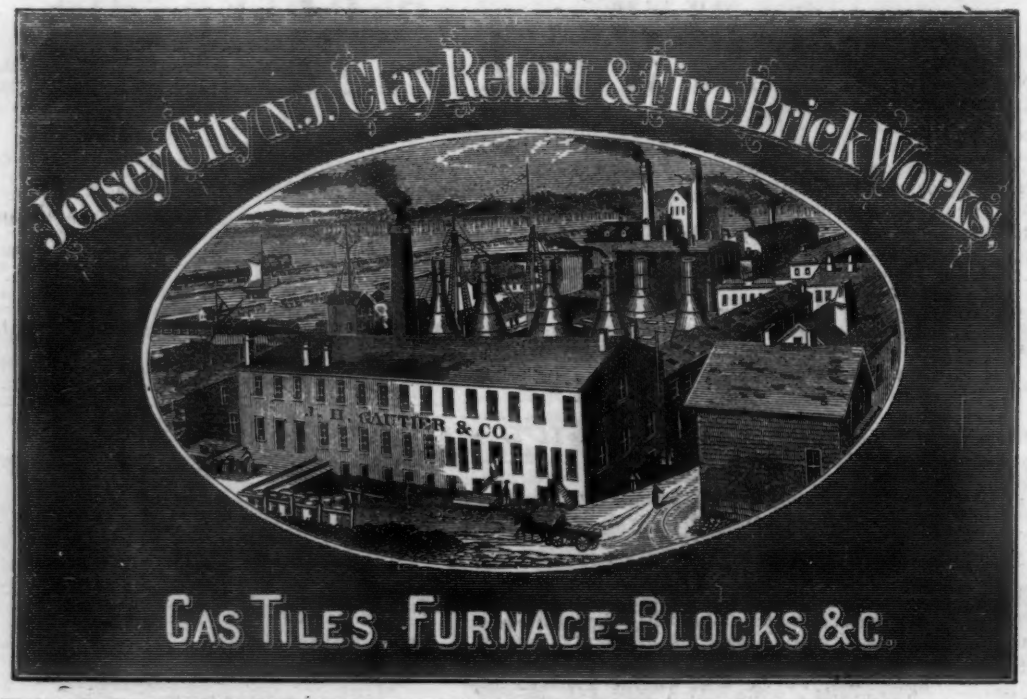

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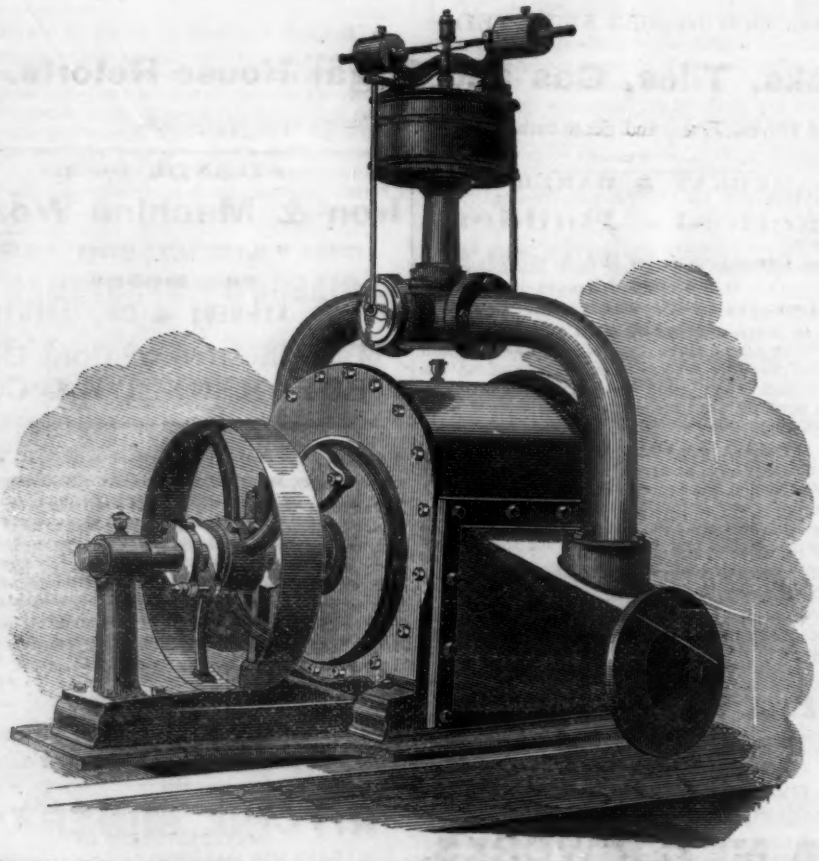

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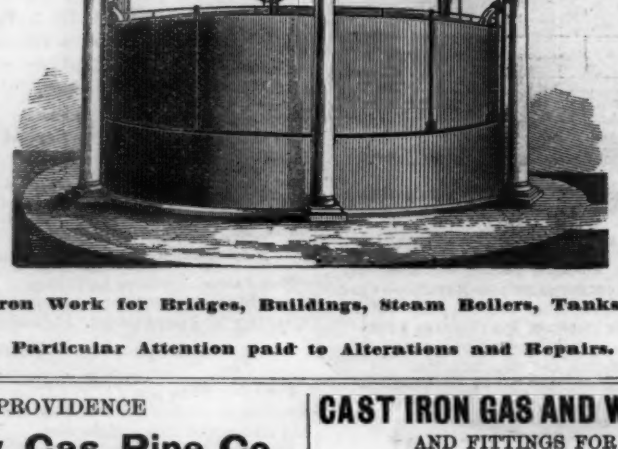

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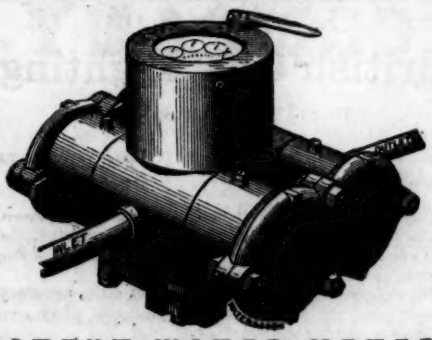

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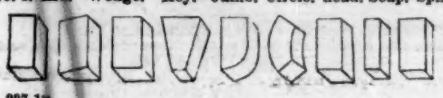

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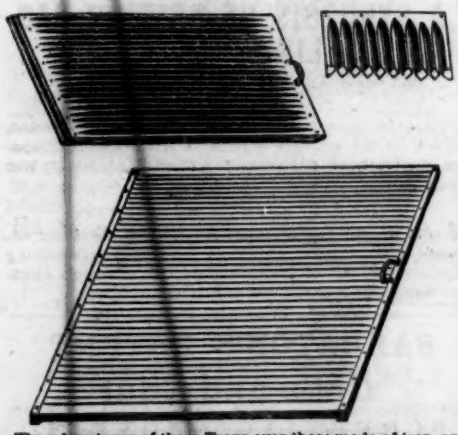

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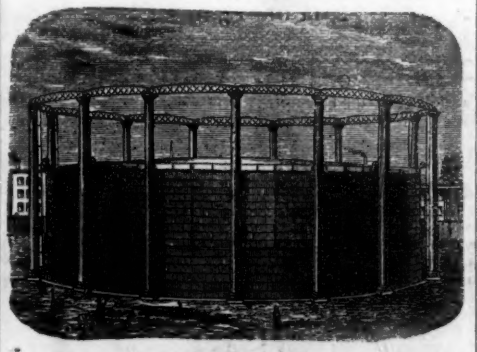

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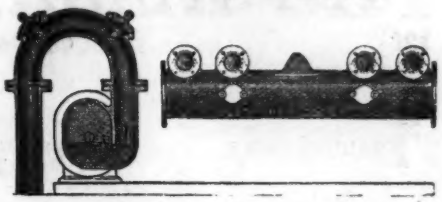

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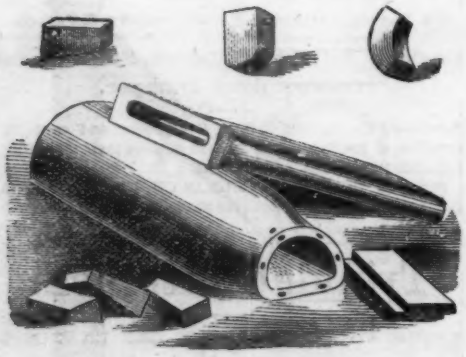

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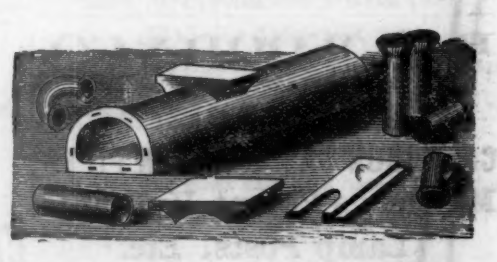

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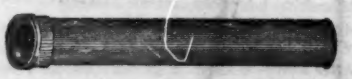

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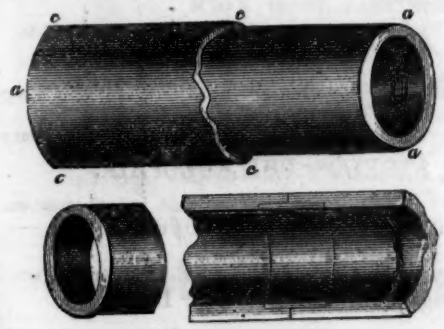

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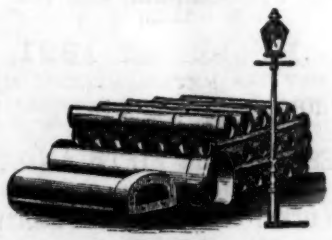

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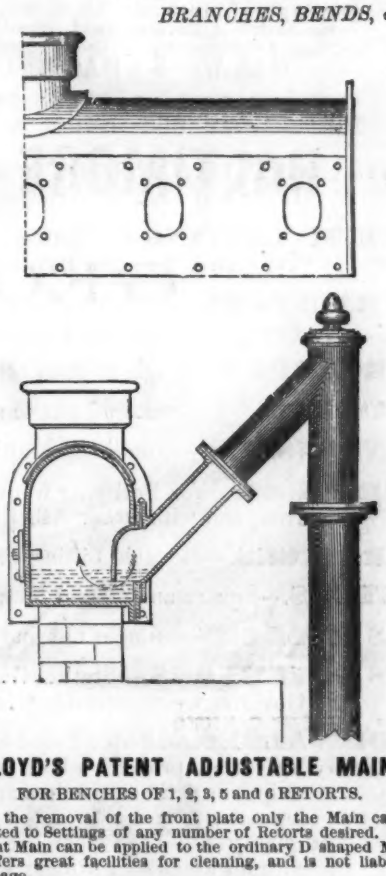

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